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UNITED STATES DEPARTMENT OF AGRICULTURE  
SOIL CONSERVATION SERVICE

Summary Review of Monthly Reports\*  
for  
SOIL CONSERVATION SERVICE RESEARCH\*\*

JULY 1946

SEP 10 1946

EROSION CONTROL PRACTICES DIVISION

Visitors - B. H. Hendrickson, Watkinsville, Georgia. - "Visitors, first 7 months of 1946, totaled 929, 37% increase over the corresponding period of 1945."

Field Tour - Carl L. Englehorn, Fargo, North Dakota. - "On June 20, the Burleigh County Soil Conservation District conducted their field tour which was attended by approximately a hundred farmers of the area. Conservation practices being applied to farms within the District were inspected. Of major interest were the cooperative field trials of tillage method and the demonstration in the use of stubble mulch tillage equipment. Mr. Jake Deitrich, one of the cooperators, now uses stubble mulch tillage on most of his summer fallow and considers such tillage rather essential to successfully handling of the sandy soils of this area."

Manure and Erosion at Marcellus - G. R. Free, Marcellus, New York. - "A rain amounting to nearly 2 inches with 1.15 inches of it in 45 minutes caused runoff from every plot of the experiment where two rates of manuring are being compared -- when plowed under and when applied as top dressing. Samples and calculation of data have not been completed yet, but the relative weights of water and soil together were as follows:

6 tons manure plowed under for corn....	100
12 tons manure plowed under for corn....	47
6 tons manure as top dressing on corn..	14
12 tons manure as top dressing on corn..	8

"This is the fourth year of this experiment with a 3-year rotation. The marked differences in effect of methods of application have been consistent since the start, but this is the first year the effect of rate has shown up to any significant degree."

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\*\*All Research work of the Soil Conservation Service is in cooperation with the various State Experiment Stations.

Orchard Cover Crops and Fruit Size at Geneva - E. A. Carleton, Geneva, New York. - "In the progress report of June 1946, the amount of dry matter production from field brome as a surface cover was given. This cover was disced early in June to arrest growth and form mulch to protect the soil from erosion. The cherries were harvested July 17-19. The size of fruit and cover crop are given below:

Management	Number of trees	Cherry size, avg. weight 100 cherries
Field brome.....	12	407
Tall fescue.....	12	402
Birdsfoot trefoil.....	12	398
Kentucky bluegrass.....	9	392
Creeping red fescue.....	12	385
Ladino clover.....	12	384
Cultivated.....	11	377
Brage orchard grass.....	11	377
Perennial rye grass.....	12	352

Earthworms Vary with Covers in Cherry Orchards - Henry Hopp, Beltsville, Maryland. - "Samples were taken to a 12-inch depth under three different types of cover conditions on Ontario sandy clay loam at Geneva, New York: (1) Fallow, (2) perennial grass-legume mixtures, (3) field brome, (Bromus arvensis) which is disked down annually in July leaving a mulch residue. Counts were made of both the mature worms and the young, newly hatched worms:

Treatment	Earthworms (thousands per acre)		
	Young	Mature	Total
Fallow.....	116	154	270
Perennial grass.....	811	309	1,120
Field brome mulch.....	1,500	425	1,900

"The field brome mulch was particularly favorable for the earthworms. The soil was moist under the mulch cover formed by the dead residue, whereas the soil was much drier under the perennial grass. The worms under the brome were active and reproducing, as evidenced by the larger number of young worms. Those in the perennial grass were mostly curled up and inactive."

Survey of Sod Breaking - H. H. Fennell, Amarillo, Texas. - "A cross-section survey of sod breaking was first undertaken, covering the territory lying along the line of travel from Amarillo through Dunns and Stratford, Texas; Boise City, Oklahoma; Springfield, Lamar, Kit Carson and Cheyenne Wells, Colorado; Sharon, Winona, Oakley and Selden to Oberlin, Kansas. The most extensive 1946 plowing of sod lands was observed in Baca and Cheyenne Counties, Colorado, and in Wallace County, Kansas, reaching a maximum of approximately 18 percent increase in the cultivated acreage sampled due to 1946 plowing."



Pitting Improved Range - O. K. Barnes, Laramie, Wyoming. - "Range pitting has changed the composition of the shortgrass range from 90% shortgrass--10% midgrasses--forbs to approximately 80% shortgrasses--20% midgrasses--forbs, or, in other words, to an 'excellent' class. This was done by an expenditure of 50 to 75 cents per acre for pitting. In addition, during five years on one group of pitted pastures the following extra grazing was obtained:

	1942	1943	1944	1945	1946	Ave.
Additional sheep carried per acre, compared to non-treated range	0%	25%	56%	41%	50%*	34%
	Equal use					

\*1946 estimated

"In short, the pitting brought the range up to an 'excellent' condition for 50 to 75 cents per acre and allowed a 1/3 increase in grazing rate and approximately 60 pounds more lamb gain per acre over a five year period than was obtained from the non-pitted 'fair' to 'good' range.

"Mr. Nelson reported that Mr. Mark Hirsig, a sheep operator in eastern Wyoming who pitted about 700 acres of his range this year, was highly pleased with the results this first year. Mr. Hirsig said that it has been a long time since he had had western wheat grass that looked as good as it did on this pitted area. Incidentally, he covered this 700 acres in 10 days with one man, tractor and disc."

Mexican Bean Beetle Invades Lima-Bean Belt of California - Maurice Donnelly, Riverside, California. - "The worst insect pest of bean plants, the Mexican bean beetle, was discovered in a lima-bean field in Ventura County, California, in July 1946. The field is bordered on the north by a main highway and on the south by a main-line railroad. The locality is in the heart of the lima-bean section of Ventura County and is about 8 miles distant from the Sonris Experimental Farm. The infestation is known to have spread some five miles from original location. Heroic measures are being taken in an attempt to eradicate the pest. Badly infested fields are being sprayed with oil and burned with a flame machine. Other fields surrounding these are being dusted by public agencies. If dusting or spraying proves to be needed to control the Mexican bean beetle on lima beans, it probably will increase costs to the point that marginal fields will be forced out of lima bean cultivation."

Stubble-Mulch and Wheat Production - C. J. Whitfield, Amarillo, Texas. - "The 1946 wheat grain yields from the weight of stubble and depth of covering study are of interest. The addition of residue increased yields greatly for tillage with the 30-inch sweeps which leave the residue on the surface. The reverse was true with the oneway and the moldboard plow plots were practically a complete failure. The average for the three plots tilled with the sweeps was much above the oneway group. However, there was almost no difference in yield between onewaying and sweep tillage where all the wheat straw residue was removed. The theory that heavy straw should be onewayed or plowed under or burned has been proven false in the four years these tests have been run.

"The following table gives the detailed yields for 1946:

Weight of Stubble and Depth of Covering Study  
(Average of 2 Plots)

Weight of Stubble	Yield - Bushels per Acre		
	30" Sweeps	Oneway	Moldboard Plow
0 pounds	2.05	2.15	.55
1500 pounds	5.94	1.13	.49
3000 pounds	8.87	.95	.90

Note: There is a deficiency in precipitation of 4.65 inches for the first seven months of 1946 based on the 8-year station average and 7.56 inches compared to the 53-year average.

Since the 1500-pound rate of straw is near the average straw yield, the significant difference in yields is the much greater yield with stubble-mulch tillage over onwaying on the 1500-pound rate."

Effect of Contouring and Other Cultural Treatments on Wheat Yield -  
Alvin E. Lowe, Garden City, Kansas. - "The basin project wheat plot yields were determined early in July and a table giving the 1946 yields as well as those of former years and averages is included.

Cultural treatment	Bushels grain per acre						6 yr.	14 yr.
	1941	1942	1943	1944	1945	1946	Avg.	Avg.
44" Basin list on contour	30.6	18.9	18.4	28.5	24.5	12.2	22.2	20.9
44" Ordinary list on contour	31.8	17.9	17.4	26.7	24.6	16.1	22.4	21.2
44" Basin list up and down slope	30.0	19.3	10.5 (b)	21.8	19.1	19.2	20.0	17.6
44" Ordinary list up and down slope	27.4	14.2	10.2 (b)	25.7	16.6	15.6	18.3	17.0
30" Basin on contour	31.8	15.2	19.2	20.5	32.2	17.9	22.8	22.4
30" Basin up and down slope	27.2	15.3	17.1	19.2	25.8	17.0	20.4	19.3
One-way on contour	30.9	15.2	17.6	25.0	30.2	16.3	22.5	22.3
One-way basined on contour	25.3	17.3	16.5	26.0	24.1	19.4	21.4	21.5
Good Farm Practice (Basined on contour)	29.8	14.3	16.2	26.1	25.0	16.7	21.4	21.0
Trashy Fallow (Straight blade or sweeps)	21.8 (a)	11.1 (a)	6.2 (b)	24.0	28.9	14.5	17.8 (a)	18.4

- (a) Not comparable to other methods as short fallow period both years in getting method started.  
(b) Badly infested with Russian Thistle.

"Contouring for a six year period has given approximately 15% increase in yield over non-contouring but basining has shown no increase when used on the contour but it has almost a 2 bushel increase in yield when used up and down the slope."

Contouring Increased Oat Yield - Dwight D. Smith, Columbia, Missouri.-  
"The average yield of 8 contour oat tests was 32.3 bushels per acre in favor of contour planting. This was a 7.5 percent increase. Six of the eight tests showed an increased yield with contouring and two a decreased yield."

Burning and Plowing Stubble Caused Wind Erosion - Hugh C. McKay, St. Anthony, Idaho.-"The first seven months of 1946 have been the driest on record at the station since records were begun in 1919. The hot dry weather has been accompanied by winds of high velocity nearly every day resulting in considerable wind erosion in this area. The fields subject to wind erosion this summer have been the fallow fields where the stubble was burned or where the moldboard plow was used. If this year is followed by another hot dry year with high winds a very serious wind erosion problem will develop. The amount of stubble and residue left for soil protection for next year is considerable smaller than normal."

Improved Row System on Tobacco Land - T. L. Copley, Raleigh, North Carolina.-"During all the heavy rains of the current growing season, the improved row layout has given excellent results in the terraced areas. Drainage has been good and erosion has not been serious. There is some indications of appreciable soil movement in the lower portion of the 600 foot rows. This indicates that tobacco rows should be as short as possible, and that wherever possible field depressions should be utilized as vegetated outlets for both terraces and rows.

"In one portion of our tobacco field where rows were run across terraces, similar to local farmer practice, erosion along the row middles has been serious, with heavy sand deposition in the terrace channel. Drainage along the channel has been poor, and drowning of the tobacco has occurred.

"With all the rains of June and July there has been heavy damage to the tobacco crop in the eastern part of the state because of drowning. Soil conservation technicians, however, report outstanding results where proper row layout was used. This indicates that more emphasis should be placed on row layout, even in the coastal plains area of the state. These conditions will be studied further."

Survival in Kudzu Plantings - E. C. Richardson, Auburn, Alabama.-"In 1944-45 planting season, the average survival for all the planting was approximately 60 percent. Higher survivals were obtained on sandy land than on clay soil. In the November planting best survival was obtained by the deep furrow. There was a gradual increase in percentage survival from North Alabama to South Alabama for the November planting.

"In the 1945-1946 planting season the survival of plants planted in November averaged approximately 40 percent. Higher survivals were obtained in South and Central Alabama than in North Alabama. The survival for the January and February plantings was approximately 55 and 65 percent. Higher survivals were obtained by the hole method than by the other two methods used."



New Soil Sampler - Russell Woodburn, State College, Mississippi. - "A number of field tests of the new soil sampler were carried on during the month by Mr. T. N. Jones and the writer. The sampler successfully took cores of Yazoo clay at 50% moisture without compression. Yazoo is 80%, 2 micron clay. A paper entitled, 'A Soil Sampler for Pore Volume Studies' was prepared by Mr. Jones and the writer for submission to Agricultural Engineering Journal."



DRAINAGE AND WATER CONTROL DIVISION

Hydrologic Studies - L. L. Harrold, North Appalachian Experimental Watershed, Coshocton, Ohio.-"Of the 5.21 inches of rain for the month, 3.29 inches fell in two days, July 11 and 21. The rain of July 11, totaling about 2.0 inches in general, did not cause as much runoff and erosion as the storm of July 21 of 1.3 inches. The 5-minute maximum rainfall for the earlier storm was 2.6 inches per hour and for the later storm 4.1 inches per hour. Runoff and erosion for the corn and wheat watersheds is given on page 8.

"The effectiveness of contouring alone on conservation of soil and moisture as well as the effectiveness of strip cropping is obvious from the data given. It is interesting to note that on July 11, the large strip-cropped (corn - meadow) watershed yielded more runoff and had a higher flood peak than that for the straight-row corn field. This situation reversed itself in the July 21 storm. An analysis of these storms will reveal the reasons for such behavior.

"In spite of the excessive number of storms and much field work, the tabulation and compilation of records for 1946 is practically up to date.

"There is ample available moisture in the soil to make a good corn crop. Soil moisture in the mulch plots as given in the following table showed differences:

Depth	Plowed	Mulched
	Percent	Percent
0-7 inches	18.0	20.9
7-14 inches	16.3	18.1

"Wheat yields on the improved practice watershed amounted to 36 bushels per acre as compared to 20 bushels per acre on the prevailing practice watershed. This difference is showing up in the new meadow seeding in the wheat. There was no runoff nor soil loss from the improved watershed (No. 123), whereas, both occurred on the prevailing-practice watershed (No. 115)."

Hydrologic Studies - J. A. Allis, Central Great Plains Experimental Watershed, Hastings, Nebraska.-"During the month of July 3.45 inches of rain was measured at the Meteorological station which is a little above the normal long year record of 3.32 inches at Red Cloud and Hastings, Nebraska.

# Runoff and erosion for the corn and wheat watersheds

Watershed: No.	Drainage: area: Acres	Land use	Storm of July 11			Storm of July 21		
			Total	Flood:	Soil	Total	Flood:	Soil
			Inches	Runoff:	loss:	Inches	Runoff:	loss:
			Inches	In/hr.	T/acre	Inches	In/hr.	T/acre
103	0.65	Corn - contour	2.07	0.09	0.26	1.31	0.20	0.63
110	1.27	Corn - straight	2.07	.15	.61	1.31	.35	1.25
192	7.86	Corn - straight	2.13	.35	.86	1.20	.35	1.05
185	6.87	Corn-meadow strips	2.13	.40	1.17	1.20	.19	.70
115	1.61	Wheat- prevailing	1.94	.003	.02	1.35	.08	.03
123	1.37	Wheat- improved	1.94	0	0	1.35	0	0
109	1.69	Wheat- improved	1.94	0	0	1.35	0	0

"A total of 1.38 inches of rain fell on July 16 which produced peak rates in inches per hour as follows on the corn watersheds:

Watershed No.	Area	Corn Straight rows	Corn Contoured	Corn Subtilled
4-H	3.84	0.29		
8-H	3.93		0	
11-H	3.85			0.26
12-H	3.66	.54		
17-H	3.96		.56	
19-H	4.10			.25
24-H	4.21			.22

"Following is a table showing the yields from the small watersheds for 1946:

WHEAT

Watershed No.	Area	Straight rows	Contoured	Subtilled
3-H	3.95		12.3	
5-H	3.93	12.3		
13-H	3.41	15.1		
14-H	3.35			12.1
16-H	3.57		12.9	
21-H	3.94			12.0
22-H	3.99			13.3
Average Yield Bu/Acre		13.7	12.6	12.5
<u>OATS</u>				
6-H	4.16	13.1		
7-H	4.15	10.9		
9-H	3.78		23.1	
10-H	3.98			23.4
15-H	3.62		23.0	
20-H	4.05			25.7
23-H	4.06			19.9
Average Yield Bu/Acre		12.0	23.0	23.0

Hydrologic Studies - R. B. Hickok, Lafayette, Indiana.-"The following table shows comparison of runoff from permanent pasture and woodlot watersheds on the Dairy Farm for the afternoon rain of July 20:

Rainfall and Runoff Experimental Watersheds,  
Purdue Dairy Experiment Farm, Lafayette, Ind., July 20, 1946

Water-shed	Land-Use	Total rain: Inches	Total runoff: Inches	Max. 10 min. rain intensity: In./hr.	Max. runoff rate In./hr.
31	P. Pasture	2.08	0.44	4.67	0.88
32	P. Pasture	2.14	.28	4.74	.56
33	Pastured Woodlot	2.14	.17	4.94	.10
34	Protected Woodlot	2.14	.01	4.94	.01

The difference between permanent pasture watersheds 31 and 32 is in accord with previous records and is considered chiefly due to soil-physical differences resulting from more recent cultivation and greater erosion on Watershed 31. The differences between the pastured woodlot and the permanent grass pastures were greater in this instance than for some other similar storms. This is probably due to considerably lighter grazing than in some past seasons.

"Plant tissue tests made on the corn watersheds early in August indicated that potash was low and nitrogen and phosphorus were present in moderate amounts on the 'prevailing' practice watersheds. On the conservation-practice watersheds, nitrogen and potash appeared to be adequate; but phosphorus was moderately low. Growth of corn on the conservation-practice watersheds is appreciably greater than on those under 'prevailing' practice."

Hydrologic Studies - R. G. White, East Lansing, Michigan.-"Precipitation for the month of July measured 0.05 inch at the cultivated watersheds, 0.04 inch at the stubble-mulch plots, and 0.18 inch at the wooded watershed, as measured by the Standard United States Weather Bureau type non-recording rain gage. The 40-year average for July, according to the United States weather Bureau at East Lansing, is 2.67 inches. A review of the 83-year record of the United States Weather Bureau data for East Lansing shows that the only other July approaching this past month for dryness was in 1916 when precipitation measured 0.09 inch. There was no runoff nor soil loss during the month.



"At the time of writing the June report, erosion losses for the June runoff had not been calculated. The following table gives the runoff and soil loss data for the month of June for Watershed 'A' (corn):

Date	Precipitation	Runoff	Runoff	Soil loss
	Inches	Inches	Percent	T/acre
June 17.	1.13	.2280	20.18	.47
June 20	.69	.1618	23.45	.12
June Total	2.71	.3898	14.38	.59

The current drouth in Central Michigan started late in June, with only 0.05 inch of rain falling at the cultivated watersheds since June 20. At Cultivated 'B' (brome-alfalfa sod), the soil-moisture content is below the wilting point for the surface 48 inches. At Watershed 'A' (corn), the soil-moisture content is down approximately to the wilting point for the surface 12 inches.

Soil moisture data, June - July, 1946<sup>1/</sup>

Watershed 'A' (Corn)							
Depth	May 31	June 10	June 20	June 30	July 10	July 20	July 30
1	11.5	11.5	13	11	6.5	5.5	4.5
3	15	14.5	15	13.5	8	5	4.5
6	15	14	15	13.5	8.5	6	6
9	15.5	14.5	16	13.0	9.5	5	4
12	16.5	15	17	15.5	11.5	7	3.5
18	15	14.5	15	14.5	12.5	8	7
24	16	15.5	15.5	15	14	10.5	9.5
30	15	14.5	14.5	14.5	14	13.5	12.5
36	13	13	13	12.5	13.5	11.5	11
42	15	15	15.5	15	15.5	14.5	15
48	10	11	11.5	11	12.5	11.5	11
60	8.5	8.5	8.5	8.5	9.0	8.5	8.5

<sup>1/</sup> The soil-moisture content at 10-day intervals at selected depths for Watershed 'A' is shown in the above table.

Soil moisture data, June - July, 1946<sup>1/</sup>

Watershed 'B' (Brome-Alfalfa Sod)							
Depth :	May 31 :	June 10 :	June 20 :	June 30 :	July 10 :	July 20 :	July 30 :
1	8	5	10.5	3.5	3	3	3
3	9.5	6	10	4.5	3.5	3.5	3.5
6	8	6.5	5	5	3	3	3
9	9.5	6.5	5	3.5	2	2.5	2
12	10.5	8	6.5	6.5	2	3	2.5
18	6.5	5.5	4	3	2.5	3	3
24	6.5	6	4.5	3	2.5	2.5	2.5
30	7	6	3	2.5	1.5	2	1.5
36	9.5	8.5	7	5	2	2	2
42	9	9	8	6	1.5	2	2
48	8.5	8	7.5	6	2	1.5	1.5
60	10.5	9.5	9.5	9.5	7.5	7.5	5.5

1/ The soil-moisture content at 10-day intervals at selected depths for Watershed 'B' is shown in the above table.

"Corn on Watershed 'A' has grown well throughout the month of July, but is now in the pollinating stage. Continued dry weather for a week to ten days will seriously damage the crop.

"At Watershed 'B', hay was harvested on July 5, with a yield of 1 ton per acre. Since that date, second-growth has been negligible.

"The following is a table on watershed runoff and erosion data:

Watershed Runoff and Erosion Data				
Cultivated Watershed 'A'				
Year :	Crop :	Precipitation :	Runoff :	Soil Loss
			Percent	T/acre
1941	Corn	28.47	15.04 *	9.86 *
1942	Oats	34.03	18.01	1.08
1943	Alfalfa-Brome	33.06	5.08	0
1944	Alfalfa-Brome	22.83	16.42	0
1945	Alfalfa-Brome	37.48	4.40	0
1946#	Corn	12.62	23.34	0.59
Cultivated Watershed 'B'				
1941	Corn	28.47	8.36**	11.39**
1942	Oats	34.03	22.65	1.01
1943	Alfalfa-Brome	33.06	6.44	0
1944	Alfalfa-Brome	22.83	16.80	0
1945	Alfalfa-Brome	37.48	4.62	0
1946#	Alfalfa-Brome	12.62	26.04	0

\* Record for Jan. 21 to Dec. 31, 1941

\*\* Record for Mar. 26 to Dec. 31, 1941

# Record for Jan. 1 to June 30, 1946

"The following is a table on watershed runoff and erosion data:

Watershed Runoff and Erosion Data

Wooded Watershed				
Year	Crop	Precipitation	Runoff	Soil Loss
			Percent	T/acre
1941	Oak-Hickory	28.22	0.01	0
1942	"	37.11	2.13	0
1943	"	34.99	5.02	0
1944	"	25.63	2.34	0
1945	"	38.42	0.21	0
1946#	"	14.07	0.52	0

# Record for Jan. 1 to June 30, 1946

"Soil loss at the cultivated watersheds has been limited to periods when the watersheds were planted to clean-tilled or small-grain crops. The alfalfa-brome sod entirely eliminated erosion but did not eliminate runoff during 1943, 1944, or 1945. The exceedingly high percent of runoff in 1944 and 1946, however, was largely the result of snow melt during February and March of those years.

"The 1941 soil loss of 9.9 tons per acre for corn on watershed 'A' and 11.4 tons on watershed 'B' is even more significant when one considers that usually the major portion of the soil eroded is clay, the active portion of the soil. The surface 6-inch layer of soil weighs approximately 1,000 tons per acre. Of this, roughly 15 to 20 percent or 150 to 200 tons is clay. Losing 10 tons of clay per year through erosion is roughly equivalent to losing 5 to 6 percent of the active clay of the surface 6 inches of soil.

"It will be noted that there is very little correlation between the percent of runoff and soil loss. Generally speaking, the major soil losses are confined to one or two storms per year. A summary of selected storms is given in the following table:"

Runoff and Erosion Data for Selected Storms

Date	Watershed	Crop	Precip.	Runoff	Runoff	Soil Loss
			Inches	Inches	Percent	T/acre
6-13-41	'A'	Corn	0.54*	0.32*	59.3	2.67
3-16-42	'A'	Corn Stubble	1.38	1.34	97.1**	1.90
5-12-42	'B'	Oats	0.86	0.09	10.5	0.12
3-15-43	'B'	Alfalfa-Brome	0.99	0.29	29.3	0
6-2-43	Wooded	Oak-Hickory	1.79***	1.17	65.4	0
4-7-44	'B'	Alfalfa-Brome	0.22	0.03	13.6	0
6-17-46	'A'	Corn	1.13	0.23	20.2	0.47

\* Duration of rainfall, 40 minutes. Duration of runoff, 15 minutes.

Rainfall Intensity (maximum), 9.30 inches per hour.

\*\* Snow melt contributed to runoff.

\*\*\* Duration of rainfall, 90 minutes. Maximum rainfall intensity, 3.90 in./hr.



Hydrologic Studies - H. A. Daniel, Cherokee, Oklahoma.--"New sweeps were made by Maurice B. Cox for the initial tillage work on the stubble mulch areas at the Cherokee station using lister lays and plow lay stock. These sweeps are similar in appearance to the plow lay sweeps with the same width of cut and lift of the soil. The principal advantage of these sweeps over the plow lay type is the ease with which they can be sharpened or repaired. These sweeps are designed to use a frog constructed of grader blade material and mounted on plow beams. The lister lays and extension wings are fastened to the frog with standard bolts which will make them easy to remove for sharpening or replacing."

Hydrologic Studies - R. W. Baird, Waco, Texas.--"Rainfall for this period was 1.10 less than the mean of 3.43 for June and 1.00 less than the mean of 2.21 for July. The heaviest rainfall was 1.50 on June 9. This rain caused only a small amount of runoff. The remainder of the rainfall occurred as five light showers of less than 1/2 inch each.

"In spite of the light rainfall crops have made good progress. Oats have been harvested, with a fair crop; corn is almost ready to harvest, but the crop will be small because of the excessive rainfall of May; cotton is making excellent progress and with continued dry hot weather the insect damage should not be excessive. This year about 6.5 acres of Hubam clover will be harvested for seed. A fair seed crop is anticipated.

"Considerable time has been spent preparing the cropping plan for the government owned land for 1947. The continued use of conservation practices on the Y area is beginning to be evident in the appearance of growing crops and should be reflected in yields obtained this year."

Runoff Studies - V. D. Young, Fayetteville, Arkansas.--"On July 17, 18 and 19th a field inspection trip was made with Charles Finger, Area Survey Supervisor, of 21 farm ponds located in Carrol, Madison, Benton, and Washington Counties. Also assisting in these inspections were the District Engineer and other district personnel. Both successful and unsuccessful ponds were visited. Successful ponds were those that had never gone dry and were nearly full of water at inspection date. From these inspections we concluded that:

1. Farm pond seepage is a problem in the Ozark Highlands. The rate of seepage can be wholly or partly controlled by site and building material selection.
2. Until such time as an economical means is found to stop pond seepage, the drainage area should be enlarged sufficiently to overcome this loss.
3. Too little attention has been given to the size of the drainage area draining into the pond.
4. Soil cover is an important factor in choosing the size of drainage area for any given pond.



5. Slowly permeable soils have a greater water yield than do freely permeable soils.
6. Drainage area size should be adjusted to compensate for losses by seepage, evaporation and other water uses.
7. Many of the dry or nearly dry ponds did not have sufficient drainage area with their present cover to furnish a dependable water supply.
8. The extent of seepage of some of the dry and nearly dry ponds could not be determined until after the pond had filled.
9. There is a need of research to determine the rate of seepage from farm ponds built from different soil materials as well as a determination of the rate of evaporation from small lakes and reservoirs.
10. The watershed studies are furnishing valuable information on water yields from agricultural lands for a safe and dependable water supply.

"Mr. D. B. Krimgold spent several days working with the writer. While in the area he assisted in the inspection of farm ponds and in the writing of tentative recommendations of sizes of drainage areas to furnish a dependable water supply for farm ponds. These recommendations will be submitted to the Regional Office by Charles Finger in his report on Investigations of Farm Ponds."

Hydraulic Studies - F. W. Blaisdell, Minneapolis, Minnesota.-

"Mr. Anderson completed the installation of the 2-1/4-inch diameter pipe drop-inlet culvert model. Eighteen test runs were made to determine the head-discharge curve and to record the pressure at the various points in the model. The data have been partially analyzed. Although the vacuum readings in the pipe near the riser are in line with the readings obtained from the 4-1/2-inch and 1-1/8-inch diameter models, the head-discharge curve is below the curves found for the other two models. The reason for this discrepancy has not yet been discovered. The set-up for testing the 4-1/2-inch diameter model was revised to permit photographic method of recording of the manometer readings.

"Six runs were made on the 2-1/4-inch model with the headwall removed. These were made to answer a question raised by Mr. Edwin Freyburger, Chief of the Regional Engineering Division, regarding the feasibility of constructing small drop-inlet pipes using a pipe riser and omitting the headwall to simplify the construction. Although this data have not been completely analyzed, it was observed that the vortex which developed at the top of the riser reduced the discharge approximately 25 percent when the head over the riser is 2-1/2 pipe diameter.

"The installation of the 1/9 scale model of the outlet structure to be constructed at Minden, La., was completed on July 2. This structure is being tested for the Fort Worth Regional Engineering Division. During the month tests on this model were completed. They showed that overtopping of the side walls in the transition section was a definite possibility. Modifications might be the raising of the side walls or the insertion of fillets downstream from the pipe outlet. Although the depth distribution at the entrance to the stilling basin was not uniform, the SAF stilling basin as designed operated satisfactorily and there was no scour of the riprap downstream from the outlet. When the riprap was replaced by a sand bed, the depth of scour did not extend more than 1 foot below the floor of the outlet. The use of wingwalls having a top slope of 1 to 1 and set at an angle of 45° with the outlet center line provided slightly better flow conditions downstream from the outlet and reduced the scour of the banks close to the outlet.

"Work was begun on the installation of a constant level tank and a test channel for use in conducting submergence tests of the box inlet drop spillway. At the end of the month the constant level tank had been installed and piers for the support of the flume were being constructed."

Hydraulic Studies - W. O. Ree, Stillwater, Oklahoma.-"An early start on the fall testing program was achieved this year with the first tests starting on July 17. From now until the first of December the running of the tests will take approximately 75 percent of the time of the laboratory staff. The experiments conducted this month are listed in the following table:

Table I

Channel:	Expt.:	Cover	Bed : slope:	Bottom : width:	Side : slopes:	Number of flows
FC4	3	Bermuda grass, short, green	.0265	10	6:1	8
U10	1	Sudan, tall, green	.05	3	(1)	11
U7	1	Weeping lovegrass, medium, green	.05	3	(1)	6 (2)
U8	1	Brome mixture, medium, green	.05	3	(1)	5 (2)

1/ Vertical plywood sides.

2/ Low flows (no bending of vegetation or submergence).

"Channel FC4 is primarily a waste channel for the block B unit channels. It was built entirely with machinery and receives no special maintenance other than mowing. Because of the construction method used and the maintenance received the channel typifies farm waterways in bed roughness and cover. Hence, hydraulic results from tests on this channel are directly applicable to waterways in the field. The channel has been tested each fall since 1944.

"At the time of testing the Bermuda grass was green and short, (average length grass 3.25 inches). Besides Bermuda grass there was a scattering of other vegetation including sensitive plant, lovegrass, wild pea vines, and a plant which appears to be a relative of the dandelion.<sup>1/</sup> In general the appearance of the cover was good. However, there was a small bare water course (varying in width from a few inches to a foot and in depth up to 3 inches) in the bed of the channel extending the full length of the test reach.

"The stand counts in the channel showed an average of 300 stems of Bermuda grass per square foot. This was a considerable increase over the 200 stems per square foot observed in 1945. Also there was more foreign vegetation in the channel than in the previous year.

"Experiment 3 consisted of passing 8 flows down the channel ranging in quantity from 0.9 cubic foot per second to 82.0 cubic feet per second. The average duration of a single flow was approximately 1 hour. The testing covered a period of 2 days.

"A plot of the Manning's  $n$  values against the corresponding VR values showed this cover to be in the lowest retardance group. The selection of four relationships of Manning's  $n$  to VR that represent different degrees of vegetal retardance was described briefly in the May 1946 progress report. A comparison of this plot with those obtained from the 1944 and 1945 testing showed no significant change in  $n$  between VR values of 0.5 and 3.5. Table II gives the VR and corresponding  $n_m$  values for the 1946, 1945, and 1944 tests.

Table II

VR	$n_m$		
	1946	1945	1944
0.065	0.24	0.24	0
.111	.23	.22	.18
.243	.15	.14	.13
.474	.096	.095	.094
.844	.073	.072	.074
1.48	.055	.054	.058
2.42	.045	.045	.050
3.45	.040	.039	----

<sup>1/</sup> A more exact classification of the foreign vegetations in the channel cannot be given at this time since we have been unable as yet to obtain the services of an agronomist to identify them.



"A study of the channel bottom on completion of this experiment showed that appreciable scour had taken place during the highest flow in and along the narrow water course in the bed of the channel. The amount of damage was considered excessive for a short duration (1 hour) flow. The mean velocity during the highest flow was 4.8 feet per second. This is considerably less than the 8 feet per second recommended for a good uniform Bermuda grass cover in a uniform channel. This result serves to emphasize previous statements by this project that the permissible velocities recommended for good conditions only apply to uniform channels with complete coverage. While it is inadvisable to make general recommendations on the basis of a single test, it can be said that for this particular channel (with its defect) the permissible velocity is approximately 4 feet per second, or one-half that for a good uniform cover in a uniform channel."

Sedimentation Studies - L. C. Gottschalk, Washington, D. C.-

"Carl B. Brown, together with Dr. Eldon M. Thorp began preparation of the final report on reservoir sedimentation in the Sacramento and San Joaquin drainage basins, Calif., in cooperation with United States Army Engineers at District Engineer Office, Sacramento."

Drainage Studies - Ellis G. Discker, Raleigh, North Carolina.-

"The writer has just completed a draft of an article entitled, 'New Procedure for Handling Old Farm Ditches with Dynamite', for the North Carolina State Agricultural Experiment Station, to be published in Research and Farming. This will be published in October issue. Drawings and photographs were also furnished."

"While dynamite has been employed for many years for the construction of new ditches and cleaning and deepening of old ditches, there is very little usable published information on the handling of old ditches. Old ditches are more expensive and difficult to handle than new ditches. This is especially true where appreciable deepening is required, or widening of the ditch is desired. Deepening of broad, shallow ditches to a depth of approximately 3 feet is rather simple and is handled the same as shooting a new ditch, so long as over loading is not practiced. Over loading will cause the banks to cave in sooner or later. The deep, narrow ditches requiring widening or appreciable deepening are the most difficult to handle. Inasmuch as a considerable number of these ditches at the Bethel experiment required deepening and widening before suitable outlets were obtainable, some time was devoted to this study. Actually, considerable time and explosives were saved by this study. The information obtained is very valuable to the writer and to other personnel who have old ditches to widen or deepen."

Drainage Studies - James Turnbull, Lake Alfred, Florida.-

"During the month of July an investigation was started to determine the amount of rainfall intercepted by orange and grapefruit-tree canopies with a view to evaluating the effect of interception on the development



of dry soil bodies under these trees. One hundred ninety-two cans were placed under a total of 16 trees, 8 orange and 8 grapefruit, and the quantity of water contained in each can measured after each rainfall and compared with the rainfall as measured by a recording rain gage.

"Only three rains have been observed so far with interception by grapefruit trees consistently greater than interception by orange trees. Interception for all orange trees has ranged from 13.8 percent to 40.0 percent, while interception by all grapefruit trees has ranged from 17.5 percent to 49.0 percent. The higher rates of interception in each case followed a rain of 0.17 inch while the lower rates of interception followed a rain of 0.80 inch.

"Additional tests have been run on the nozzle being developed for use in portable pipe and following these tests parts of the nozzle are being redesigned to eliminate some of the deficiencies noted."

Drainage Studies - M. H. Gallatin, Homestead, Florida. - "During the first of the month we set up, in cooperation with the Station, a series of mulch plots to check whether or not there is a difference in the type of mulching materials. The plots set up are as follows: - natural growth; shavings; check; pine straw and grass. Samples will be collected from these plots to check on the accumulation or loss of nitrates and phosphorus, and also what effect these materials will have on the reaction. This will be carried on for a year or two.

"From July 12 - 24, we had very little rain in this area, with the result that the water table began dropping very fast. During the latter part of the month we had quite a few scattered rains of 1.0 - 2.5 inches, with the result that on the average we did have a rise in the water table for the area. The total rain for the month at the corner of Mowry and Redland Road was 10.00; at the Sub-Tropical Experiment Station, 9.94 inches of rain fell.

"The following gives the increase or decrease by wells for this area:

		: Water Table M.S.L. :	water Table M.S.L. :	
Well Number :	July 2, 1946	:	July 30, 1946	: + or -
1	3.52		3.65	+ .13
2	3.84		4.28	+ .44
3	4.14		6.12	+1.98
4	4.79		4.70	- .09
5	5.01		5.11	+ .10
6	5.13		5.79	+ .66
7	5.78		6.14	+ .36
8	5.56		6.05	+ .49
9	6.02		6.31	+ .29
10	6.16		6.53	+ .37
11	6.27		6.68	+ .41
12	6.62		6.98	+ .36
13	6.94		7.20	+ .26
14	6.97		7.16	+ .19
15	6.65		7.22	+ .57
16	6.65		7.22	+ .57
17	6.22		7.07	+ .85
18	-		-	
19	5.67		6.81	+1.14
20	11.36		12.15	+ .79
21	5.61		6.25	+ .64
22	6.04		6.72	+ .68
23	5.11		5.55	+ .44

"Analysis of samples for chlorides covering the north and northwest section of Miami indicate that the chloride content in most cases is still dropping slowly. In a few cases where 8,000 p.p.m. were found last month, there has been a drop this month to near 1,000 p.p.m."

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